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(54) Title: COLLAGEN LABEL			
(57) Abstract <p>An edible label for labelling meat and other food products is formed of acidic collagen having a pH in the region 2 to 5. No adhesive layer is required, and the label adheres well to wet products, such as cut meat. The label is usually transparent and is printed with an edible ink on a reverse side of the label. The ink may be formulated to transfer onto the surface of the food product. A supply of labels may be provided in a dispenser sealed against ingress of moisture.</p>			

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COLLAGEN LABELTECHNICAL FIELD

The present invention relates to edible labels for labelling meat, particularly meat carcasses and cut meat, and other food products.

BACKGROUND

Meat carcasses are conventionally labelled (for example as to source of origin, quality etc.) by direct printing or branding onto the carcasses, but the quality of the printing is poor and is unsuitable for fine detail. For example, even using ink jet printers, it is not possible to reliably print bar codes on meat carcasses.

Other forms of labelling, such as paper or plastic tags are known, but these have the disadvantage that the tags may be accidentally left on the carcass and subsequently become splintered into sharp fragments during subsequent meat processing operations with consequent potential dangers to consumers.

It has been proposed to provide self adhesive labels of an edible material in order to deal with these difficulties. For example, patent GB2142557 discloses the use of a label formed of collagen and having an adhesive layer thereon for adhering the label to a meat carcass. Collagen is a natural material obtained from animal hides and widely used in the food industry, for example for the

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production of sausage casings. However, whilst the collagen labels disclosed in this British patent specification may be acceptable from the point of view of edibility, problems may be encountered with adhering the labels to meat products, particularly to cut meat products. The natural water in the product inhibits adhesion of the label. Moreover, since the labels are generally white in colour, the presence of labels may be noticed by the consumer who may be alarmed, notwithstanding their edible nature.

It is an object of the present invention to mitigate these disadvantages.

SUMMARY OF THE INVENTION

Thus, the present invention provides an edible label for labelling meat and other food products, the label being formed of acidic collagen having a pH in the region 2 to 5 and being free of any adhesive layer.

Thus, it has been surprisingly found that, provided an acidic collagen is employed, then the label will naturally adhere to the surface of the meat or other food product in a satisfactory manner, even if the food product is wet. The use of an adhesive is avoided and good adherence is obtained. At acid pH, the collagen has a high ability to absorb water (for example 500 to 1500% water uptake) and this is found to improve adherency.

Many treatments are known in the art for cross

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linking collagen, such as the use of cross linking agents such as dialdehydes (such as glutaraldehyde or glyoxal), or multivalent metal ions such as aluminium. Other cross linking and curing treatments include the use of liquid smoke and salt treatment. Although the collagen used in the present invention may be cross linked to some degree if desired (for example to improve the mechanical strength of the label) generally speaking increased cross linking has been found to result in reduced adherence and is therefore not preferred.

The acid collagen gel has a pH in the range 2 to 5, preferably 2 to 4. It may also include conventional additives such as polyols (e.g. glycerol and sorbitol), modified celluloses, charged polysaccharides (sodium carboxyalkyl celluloses) or uncharged polysaccharides (e.g. hydroxypropyl methyl cellulose).

The acid collagen gel may be produced using known techniques such as by subjecting limed hide splits to washing, decalcification, mincing, grinding with water and acidifying to produce a fibrillar gel; or by washing, decalcifying, acidifying and grinding (e.g. using a Fryma grinder) followed by kneading with a controlled amount of water to form a more fibrous gel.

Generally, the label is transparent, and this allows the label to be printed on either side thereof. Printing on the reverse side has the benefit that the label protects the printing from accidental damage. The ink is

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preferably formulated to allow transfer of ink from the label to the food surface so that should the label be accidentally scraped off, in all likelihood the printing will remain on the meat carcass or other food product. The present label gives a well defined transfer with good definition of detail. The label may be printed with outline boxes or multiple choices, to be filled in later, or the entire label may be printed with all necessary information prior to adhesion to the food product.

The ink used to print the label should be a food grade edible ink which should preferably dry quickly, be smudge resistant, colour fast, remain legible under wet conditions and be compatible with the food product. Preferably, the ink is suitable both for printing on the labels, and also for use in special pens for marking the labels in use.

Preferably, the label is of a thickness which combines conformability to the contours of the food product to which it is to be attached, with adequate mechanical strength during the attachment process. Preferably, the labels have a thickness in the region 15 to 50 microns, for example 20 to 35 microns.

The labels may be in the form of a continuous reel of labels in a dispenser. To avoid premature hydration, the dispenser may be sealed against ingress of moisture. Usually, the outline of the label is preprinted on the reverse side thereof, and thus the apparatus may include a

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flat surface for writing information onto the dispensed label prior to application onto the food product. Thus, the present invention also extends to a suitable sealed dispenser containing a supply of the labels.

DESCRIPTION OF PREFERRED EMBODIMENTS

Embodiments of the present invention will now be described by way of example only.

EXAMPLE I

Limed hide splits (i.e. the lower corium of the hide) were washed, decalcified with ammonium sulphate and citric acid, minced, ground and mixed with hydrochloric acid to produce a fibrillar collagen gel of pH 2.0 comprising approximately 4% collagen, 0.1% hydrochloric acid, 1.2% glycerine and 94.7% water. The gel is aged by standing for one or two days, homogenised, deaerated and then filtered. The acid gel is then extruded through a slit so that a film is produced. The film is air dried in warm air. Glycerol is added for flexibility and to act as a humectant. The thickness of the film was 25 microns (\pm 5 microns). The finished film had an acidity in the region pH 2 to 4.

The finished film had an analysis in weight percent:

collagen	68%
glycerol	19%
water	10%
fat	3%

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As a comparison, a film of neutral pH was prepared in the same manner except that the extruded film was neutralised by treatment with ammonia to increase the pH to the region 4 to 7. The neutralised film had a similar thickness to the acid film of the invention.

Both films were transparent.

The ink formulations for printing onto the collagen film were formulated as follows (percent by volume).

Ethanol	10-65%
water	20-80%
propylene glycol	3-22%
dye	2- 5%
ammonium hydroxide	1- 2%
shellac	0.1- 4%

The dye is a food grade colour and may, for example, include annatto, carminic acid, allura red, amaranth, ponceau 4R, sunset yellow, brilliant blue FCF, brown HT and brilliant black BN, alone or in combination to achieve the chosen shades. The colour is generally chosen to achieve a contrast between the label and the meat surface.

The ink was printed onto the reverse side of the collagen film to produce labels. The label may comprise a series of boxes to fill in or alternatives to chose, and may include fixed information such as a company identification. Printing may be by offset or ink-jet or other suitable method. The ink is also suitable for use in a hand-held pen. The ink dries quickly, is smudge resistant, colourfast, and remains legible under wet

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conditions. It also transfers accurately onto the meat surface and is compatible with muscle fat and collagenous tissue.

The ability of the acid labels and the neutralised labels (for comparison) to adhere to the surface of a meat carcass was assessed. The results are shown in the Table.

TABLE

Test	Adhesion	Moisture absorbtion (by weight)
1 acid	5	800%
neutralised	3	300%
2* acid	5	775%
neutralised	2	275%
3 acid	5	1000%
neutralised	3	350%

* labels applied to fatty surface of carcass.

Adhesion was judged subjectively on a scale of 1 to 5
(1 = poor; 5 = good)

The adhesion of the acid labels to the carcass was superior to the neutralised comparison labels, and in fact the acid labels were difficult to remove intact. Adhesion also correlates with ability to absorb moisture, which may assist drying of the meat surface.

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CLAIMS

1. An edible label for labelling meat and other food products, the label being formed of acidic collagen having a pH in the region 2 to 5 and being free of any adhesive layer.
2. A label according to claim 1 wherein the acidic collagen is capable of absorbing 500 to 1500% by weight of water relative to the collagen weight.
3. A label according to any preceding claim wherein the collagen pH is in the region 2 to 4.
4. A label according to any preceding claim which further comprises an additive selected from the group consisting of polyols, modified celluloses, and charged or uncharged polysaccharides.
5. A label according to claim 4 wherein the additive is glycerol.
6. A label according to any preceding claim which is printed with an edible ink.
7. A label according to any preceding claim which is transparent.

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8. A label according to claim 7 when appended to claim 6 wherein the printing is on a reverse side of the label which is intended to be in contact with the food product in use.

9. A label according to claim 8 wherein the ink is formulated such that in use ink becomes transferred from the label onto the surface of the food product.

10. A label according to any preceding claim having a thickness in the region 20 to 35 microns.

11. A dispenser which comprises a supply of labels according to any preceding claim, the dispenser being sealed against ingress of moisture.

INTERNATIONAL SEARCH REPORT

Inter. nat. Application No.

PCT/GB 94/00666

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 A22C17/10 A01J27/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 A22C A01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,2 278 039 (B. E. WILLIAMS) 31 March 1942 see page 1, column 40 - page 2, left column ---	1,2,4,6, 7
A	US,A,2 083 765 (B.E. WILLIAMS) 15 June 1937 see page 1, left column, line 30 - line 41 ---	1
A	GB,A,2 147 557 (NATURIN-WERK BECKER & CO.) 15 May 1985 cited in the application -----	1

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. .onal Application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-2278039		NONE	
US-A-2083765		NONE	
GB-A-2147557	15-05-85	DE-A- 3336151 NL-A- 8403038 US-A- 4623057	02-05-85 01-05-85 18-11-86

